

WHAT IS CLAIMED IS:

1 1. A semiconductor light emitting device of
2 double hetero junction comprising:
3 an active layer; and
4 clad layers comprising an n-type layer and a
5 p-type layer, said clad layers sandwiching said active
6 layer, a band gap energy of said clad layers being larger
7 than that of said active layer;
8 wherein said band gap energy of said n-type clad
9 layer is smaller than that of said p-type clad layer.

1 2. The semiconductor light emitting device of
2 Claim 1, wherein said n-type clad layer comprises an
3 n-type $\text{Al}_x\text{Ga}_{1-x}\text{N}$ ($0 \leq x \leq 0.5$), said active layer comprises
4 $\text{In}_y\text{Ga}_{1-y}\text{N}$ ($0 \leq y \leq 1$), said p-type clad layer comprises
5 p-type $\text{Al}_z\text{Ga}_{1-z}\text{N}$ ($0 < z \leq 1$) under a condition of $2x \leq z$.

1 3. The semiconductor light emitting device of
2 Claim 1, wherein a buffer layer is provided between a
3 substrate and one of said p-type clad layer and said
4 n-type clad layer, said buffer layer being made of GaN.

1 4. A semiconductor laser of double hetero
2 junction structure comprising:

3 an active layer;

4 an n-type layer and a p-type layer, sandwiching
5 said active layer, a band gap energy of said n-type layer
6 and said p-type layer being larger than that of said
7 active layer and a refractive index of said n-type layer
8 and said p-type layer being smaller than that of said
9 active layer;

10 wherein said n-type and p-type layers comprises
11 at least two layers, respectively; wherein in said active
12 layer side of said n-type and p-type layers is provided a
13 low refractive index layer formed of a material of small
14 refractive index, in other portion of the electric current
15 path of said n-type layer and p-type layer is provided a

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13 with said p-side electrode is p-type $\text{In}_a\text{Ga}_{1-a}\text{N}$ ($0 < a < 1$).

1 10. The semiconductor light emitting device of
2 Claim 9, wherein the composition ratio a of said In is
3 $0 < a \leq 0.5$.

1 11. A semiconductor light emitting device
2 comprising:
3 a substrate;
4 gallium nitride type compound semiconductor
5 layers having a light emitting portion, said compound
6 semiconductor layers including an n-type layer and a
7 p-type layer, said semiconductor layers being stacked on
8 said substrate;
9 an n-side electrode connected with said n-type
10 layer, and a p-side electrode connected with said p-type
11 layer;
12 wherein at least a surface of said p-type layer
13 provided with p-side electrode is made of p-type GaAs or
14 p-type GaP.

1 12. A semiconductor light emitting device
2 comprising:
3 a substrate;
4 gallium nitride type compound semiconductor
5 layers having a light emitting portion, said compound
6 semiconductor layers including at least an n-type layer
7 and a p-type layer, said compound semiconductor layers
8 being stacked on said substrate;
9 an n-side electrode connected with said n-type
10 layer; and
11 a p-side electrode connected with p-type layer;
12 wherein at least a surface of a p-type layer
13 provided with said p-side electrode is made of p-type
14 $\text{In}_b\text{Ga}_{1-b}\text{As}$ ($0 < b < 1$) or p-type $\text{In}_b\text{Ga}_{1-b}\text{P}$ ($0 < b < 1$).

1 13. A semiconductor light emitting device
2 comprising:

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3 a substrate;
4 gallium nitride type compound semiconductor
5 layers having a light emitting portion, said compound
6 semiconductor layers including at least an n-type layer
7 and a p-type layer, said compound semiconductor layers
8 being stacked on said substrate;
9 a buffer layer being interposed between said
10 substrate and said semiconductor layers;
11 wherein at least said substrate side of said
12 buffer layer contains at least one kind of element
13 selected from a group consisting of In, P and As.

1 14. The semiconductor light emitting device
2 according to Claim 13, wherein said buffer layer has a low
3 temperature buffer layer consists of $\text{In}_c\text{Ga}_{1-c}\text{N}$ ($0 < c < 1$)
4 or $\text{In}_d\text{Al}_e\text{Ga}_{1-d-e}\text{N}$ ($0 < d < 1$, $0 < e < 1$, $0 < d+e < 1$).

1 15. The semiconductor light emitting device
2 according to Claim 13, wherein said buffer layer has at
3 least a low temperature buffer layer formed low
4 temperature, said low temperature buffer layer consisting
5 of $\text{GaN}_w\text{P}_{1-w}$ ($0 < w < 1$) or $\text{GaN}_v\text{As}_{1-v}$ ($0 < v < 1$).

1 16. The semiconductor light emitting device
2 according to Claim 13, wherein at least said substrate
3 side of said buffer layer is a semiconductor layer where
4 electric current is difficult to flow.

1 17. The semiconductor light emitting device
2 according to Claim 13, wherein said buffer layer includes
3 at least one kind of element selected from a group
4 consisting of In, P and As.

1 18. The semiconductor light emitting device
2 according to Claim 16, at least substrate side of said
3 buffer layer consists of a semiconductor layer of high
4 resistance.

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1 19. The semiconductor light emitting device
2 according to Claim 13, wherein at least said substrate
3 side of said buffer layer is conductive type semiconductor
4 layer which is different from the semiconductor layer of
5 conduction type stacked just over said buffer layer.

1 20. The semiconductor light emitting device
2 according to Claim 13, wherein said buffer layer consists
3 of a p-type low temperature buffer layer formed at low
4 temperature on the surface of said substrate and high
5 temperature buffer layer formed at high temperature on
6 said low temperature buffer layer with at least the
7 surface side is made into an n-type; wherein on said high
8 temperature buffer layer are formed sequentially an n-type
9 clad layer, and active layer, a p-type clad layer, and
10 p-type contact layer in that order; wherein a p-side
11 electrode is formed on said n-type clad layer or on a high
12 temperature buffer layer exposed by etching.

1 21. The semiconductor light emitting device
2 according to Claim 20, wherein said buffer layer consists
3 of GaN; wherein said n-type and p-type clad layers
4 respectively consist of $Al_kGa_{1-k}N$ ($0 < k < 1$); wherein said
5 active layer consists of $Ga_yIn_{1-y}N$ ($0 < y \leq 1$) and wherein
6 said p-type contact layer consists of GaN.

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